

**ROLE OF TOPICAL APPLICATION
OF
NEEM WITH HENNA IN MANAGEMENT
OF BURN**



**THESIS
FOR**

**MASTER OF SURGERY
(GENERAL SURGERY)**



**BUNDELKHAND UNIVERSITY
JHANSI, (U.P.)**

**DEPARTMENT OF SURGERY
MAHARANI LAXMI BAI MEDICAL COLLEGE
JHANSI**

2000

MANISH DHINGRA

Department of Surgery,
M.L.B. medical College,
Jhansi

CERTIFICATE

This is to certify that work entitled "Role of Topical Application of Henna with Neem in Management of Burn" has been carried out by Dr. Manish Dhingra under my supervision and guidance. The result and observation were checked and verified by me from time to time in this department.

He has put in the necessary stay in the department as required by the regulation of Bundelkhand University, Jhansi.

Dated :


(Dr. R.P.Kala)

M.S.,

Professor and Head ,
Department of Surgery,
M.L.B. Medical College,
Jhansi
(GUIDE)

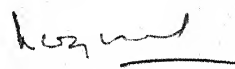
Department of Microbiology,
M.L.B. Medical College,
Jhansi

CERTIFICATE

Certified that the work entitled "Role of topical Application of Henna with Neem in Management of Burn" has been carried out by Dr. Manish Dhingra under my guidance and supervision.

His results and observations have been checked and verified by me from time to time.

Dated:


(Dr. R.K. Agarwal)

M.D.,

Associate Professor and Head,
Department and Microbiology

M.L.B. Medical College,

Jhansi

(CO - GUIDE)

ACKNOWLEDGEMENT

My vocabulary fails, when it comes to express my gratitude to all who helped in building up this thesis to its present status.

First of all I feel highly grateful to my guide Dr. R.P. Kala, M.S., Professor and Head of department of surgery. His indispensable necessary assistance and proper guidance were the main source of inspiration, making the present shape of this work possible.

I am necessary thankful to my Co- Guide Dr. R.K. Agarwal, M.D. Associate Professor and head of the department of Micro Biology, for his meticulous advice, constructive criticism and also for giving valuable time from his busy schedule at various stages of my project.

Earnestly I wish to express my most sincere regards towards all my teachers Dr. D. Pratap and Dr. Rajeev Sinha, for their consistent Help and continuous inspiration and above all their blessing which will be with me in all walks of my life.

I am thankful to all the patients for their contribution and co- operation for this project without which it would not have taken off.

I am highly indebted to my parents, my wife and all other family members, friends and well wishers

for their constant moral support and encouragement
always.

In the last but not the least, I am thankful to
Vikas Awasthi & Wilfred Pereira, who made this work
neat & clean in time.

Dated:

Dr. Manish Dhingra
Dr. Manish Dhingra

CONTENTS

Introduction	5 - 6
Review of Literature	7 - 22
Material & Method	23 - 37
Observation	38 - 49
Discussion	50 - 58
Conclusion	59 - 61
Bibliography	62 - 68
Summary	(Enclosed in Separate Cover)

INTRODUCTION

INTRODUCTION

Ever since the mankind came into the existence, fire has been one of the major necessities of life, sidewise proving its tyranny against us on several occasions. As time of moving ahead, thus necessary ingredient of life is becoming more & more dangerous as mortality & morbidity is increasing due to the fire accidents.

Flame injury most commonly, that following a house fire or ignition of clothing is prominent type of burn injury but approximately 2 to 3% of all burn requiring hospital treatment are caused by scalding with hot liquid.

Burns produce wide raw areas. Coverage of these areas expeditiously still remains inseparable part of treatment. Main problem is to cover such wounds (1) to protect micro - organism invasion from without (2) to prevent abnormal loss of heat and body constituents i.e. water, minerals & proteins from within. Normal intact skin would have protected invasion by micro-organism and prevents loss of body constituents. Due to these two reasons, topical therapy assumes greater importance.

An ideal topical agent should have a wide spectrum of action against all possible microbes, least toxic to the patient, non-toxic as systemic absorption of drug with minimal development of resistance against drug. It also should be painless, should not stain wound & easy for application, removal & it should prevent water evaporation & desiccation of the repairing tissue & it should penetrate eschar & overall it must be cost effective as far as condition pertaining to our country.

There are lot of topical agents which are used either biological or synthetic but none of them fulfil the criteria of being an ideal topical agent.

The emphasis of this study, i.e. topical application of Henna with Neem paste is to provide almost an ideal topical agents which is cost effective, least toxic rather beneficial in many other terms & much easier to apply & remove & cost effective.

REVIEW OF
LITERATURE

REVIEW OF LITERATURE

Burn is the oldest form of injury to inflict mankind. Even the prehistoric man suffered burn from lighting, molten lava and stream of hot springs. The epidemiology of burns has gradually changed, inflicting the changing environment of man. Electrical, chemical and radiation burns have been the price for industrialisation. In addition homicidal and suicidal burns have been a result of social development.

Ebers Papyrus (16th century B.C.) one of oldest amongst medical writings, contains a reference to burns. In Edwin Smith Papyrus (17th century B.C.). it is recommended to use strips of oil soaked linen cover the burn wounds, quite similar to use Vaseline gauze today, Sushruta "THE FATHER OF ANCIENT PLASTIC SURGERY", was first to describe in Sushruta Samhita "the clinical symptoms of burns and emphasised fair and enormous thirst as being characteristic, he also recommended debridement of loose skin and flesh. In 5th and 6th century B.C. Chinese and Japanese used tinctures and extracts from tea leaves (rich in tanin) over the burn

wounds. Tannic acid continued to be used in burn till end of world was it.

Hippocrates (5th century B.C.) advocated using a mixture of old Swine's seem (Lard), resin and bitumen. This was spread over a piece of cloth and warmed just before the application as a bandage. He also treated burns with solutions from oak bark and advised vinegar soaked dressing to relieve pain. He taught the principle of avoiding suppuration by simple cleanliness, irrigation with water or wine and by keeping the wound dry.

Camellius Celeus (100 A.D.) was a Roman writer on Medicine, agriculture and law etc. rather than a physician. He has devoted a full section to the treatment of burns. He described new herbs for local application. He also wrote about surgical approach to the contracted scar in burns and advised excision.

During 9th and 10th century, the famous Arabian physician Rhazes and Avicenna emphasized the use of rose water cooled by snow or the ice water respectively.

The first classification of burn injury was provided by Fabricious Hidanus fater of German-Surgery, in his book "DE COMBUSTIONIBUS" published in 1607 in latin. He classified burns into three degrees from their external appearance viz. (1) Redness and blistering of skin (2) withering if the skin without charring and (3) eschar formation with charring.

Later, Heister (168501758) classified burns into four degrees. While Baron Gillaume Dupvytren (1777-1835), famous French surgeon, classified burns into six degrees depending upon the depth of injury. In short, Dupvytren's classification is as follows :

1. Erythema - blenching on pressure.
2. Blistering with loss of epidermis.
3. Destruction of a part of papillary body.
4. Destruction of whole of Dermis.
5. Formation of eschar up to and including the muscle.
6. Carbiration of full; thickness of the burned part.

Sir Joseph Lister (1867) introduced the principle of antiseptic into clinical surgery and

it resulted into drastic reduction in the incidence of postoperative bacterial infections. Van Brigmann pioneered the concept of asepsis, a logical extension of the antiseptic principle, and this led to a further decrease in morbidity and mortality. It is surprising that the little work was done on the bacteriology of burn wounds in the 100 years that elapsed since Lister's discovery. Thus the post Listerian record in burn wound care was a continued dismal failure.

As noted earlier, since the dawn of recorded history, a myriad of agents have been suggested and applied over the burn-wound, many of these worked "well" because without an understanding of pathophysiology and fluid resuscitation, all patients except those with minor injuries succumbed.

The development of efficacious and specific topical agents, had to await the understanding of burn shock effective fluid resuscitation and a study of the bacteriology of the burn wound.

Although the exposure method of burn wound management must have actually been used for several centuries, it is Copeland (1887), from Alabania,

who is credited for having proposed it is recent times. Wallace (1949), from Edinburgh, reintroduced the open or exposure method in Great Britain, while Pulaski, Artz and Blocker evaluated its pros and cons in the United States.

In 1925, Edward Clark Davidson introduced the use of tannic acid spray on the burn wounds. He believed it decreased fluid loss and pain and produced a clear eschar. The use was discontinued when Mc Clure (1944) showed that tannic acid was hepatotoxic. In 1933, Aldridge promoted 1% gentian violet as a topical agent due to its bacteriostatic effects. This did not work well because severe infections were found trapped beneath the eschar. Aldridge along with Firor were first to explain infection as the cause of burn toxemia leading to a search for substances that could combat infection.

In 1965, Moyer and Monaf, independently used 0.5% silver nitrate solution as a topical agent in burn, while Moncrief used sulfamylon (Mafenide). It was Fox in 1969, who introduced silver sulphadiazene (SSD) which is still being used effectively. Its advantages over silver nitrate are that SSD penetrates the ecshar readily and silver

ions are released slowly and in a concentration such that they are selectively toxic to pathogens.

Silver ions act on the bacterial cell surface causing alternation in cell wall and cell membrane leading to death.

Here we are mentioned some currently available topical agents which we used in this study.

POVIDONE - IODINE (PVP-I) SOLUTION

Garner et al. (1949), Ceorgide (1962), cornnell (1964), Copeland (1972) and Micholas, G. Goargide (1972) reported their experiences with PVP-I. They found that this to the one of the best and most preferred antiseptic agent as its broad spectrum, good penetrability through eschar while exerting its microbicidal effects. It does not have surviving and proliferating tissue and has neither antigenecity nor any skin reaction. It has a "tanning" effect and enhances wound healing by preventing infection.

Law and Ms-McMillan (1974) reported adverse effects on PVP-I on thyroid gland in two patients.

Zelimer and Buxxi (1985) have never seen thyroid dysfunction in patients treated with PVP-I.

Their experience showed a mitral steep increased in iodine level in blood and a parallel one in urine. These increases reached their maximum in 2nd and 3rd day. There after iodine concentration in serum falls and a little later urine concentration falls as well despite continued administration.

NEOSPORIN POWDER

Neosporin powder (Wellcome and Burrough) consists of three ingredients:

1. Neomycin sulphate.
2. Zinc bacitracins.
3. Polymyxin-B.

Neomycin is predominantly a locally acting bactericidal having adverse effects like nephrotoxicity and depression of respiratory system.

Polymixin-B is effective against M. Pertusis, pseudomonas, E. coli, and other negative bacilli. Side effects include acute renal failure and nystagmus.

Bacitracin is effective against gram positive cocci bacilli. Its systemic absorption is little and allergic reactions are rare.

AMNIOTIC MEMBRANE

Amnion is the inner one of two foetal membranes. Its inner surface is in contact with contents of amniotic sac i.e. the amniotic fluid and foetal body. Its other surface is separated from decidua of maternal uterus by chorion.

Histologically amnion is constructed of 5 different layers .

1. Epithelium : It is composed of single layer of apparently simple, non-ciliated, cubodial cells. Recent work has suggested the role of amniotic epithelium in exchange of fluid and electrolytes between amniotic sac and mother.
2. Basement membrane: It is narrow band of reticular tissue lying at base of epithelium layer. It is adherent to other epithelial layer firmly.
3. Compact layer: It is dense, acellular lying immediately deep to basement membrane and normally can not be separated from it. It can be better in heavy stained sections.
4. Fibroblast layer: It is composed of fibroblast net work present in mesh of reticulum. Fibroblast and Hafbour cells (Macrophages) are

normally present in this layer. It forms a considerable part of the thickness of amnion.

5. Spongy layer: It is composed of extrabryonic coelomic reticulum. It is capable of great distension. It contains mucus in its structure which enables the layer to alter the shape.

Depth of membrane - Is $1/50$ to $1/2$ mm which may increase as much as 2.5 cms.

Blood Supply - Amnion does not have any blood supply at term as well as not at any stage of pregnancy.

Nerve Supply - Nerve supply has been described in the amnion, but this finding has not been confirmed.

Lymphatic vessels - Possibility that amnion contains lymphatic vessels have been given by some worker. Very many large spaces are present between the bundles of the reticular fibres of fibroblast and spongy layers but actual lymphatic vessels have been observed.

CLINICAL AND EXPERIENTIAL APPLICATION OF AMNIOTIC MEMBRANE

Pigeon (1960) applied the amniotic membrane in burn cases with full aseptic precautions and observed following effects :

A. Immediate Effects :

1. Pain relived at once after application and no more analgesic was required.
2. Antibiotics were used only on development of complications.
3. Dressings were generally found quite dry and escape of fluid was prevented.
4. Healing of the wound was rapid and complete.

B. Delayed Effects :

1. Discoloration which follows primary healing was not presented in the cases treated with amnion.
2. Minimal scar tissue formation by immediate production of injured cell or dermis which were responsible for scar formation.

He also stated that amniotic membrane undergoes changes similar to which occurs to cornified cells.

Dino (1965) reported the use of amniotic membrane in burn cases. Control study was also done. Following points in favour of amniotic membrane dressing were suggested ;

1. It is homograft which most closely resembles the skin being a direct continuation of foetal integument along the umbilical cord.
2. It can be easily available and have minimal contact with the maternal blood.
3. It is fairly strong to be handled.
4. It is highly stretchable and can cover a wide surface.
5. It is available with negligible cost.

Dino (1966) studied to find out the best preservative. He presented the amniotic membrane in following type of solution.

1. Sterile normal saline solution.
2. Benzyl Konium chloride (1:1000 dilution) in sterile solution.
3. Sodium hypochloride (1.40 dilution) in sterile saline solution.

4. Saline solution (400cc) with 50000 units of crystalline penicillin+ 1gm streptomycin sulphate.

5. Saline solution (400cc) with 1gm neomycin sulphate .

The preserved graft were kept in refrigerator of blood bank at 4°C temperature.

Bacteriology studies at regular interval were done to test efficacy of used preservative. Amniotic membrane was preserved from fresh stage to one month and used in the treatment. .

From the bacteriological studies at preserved membrane which was done on 1st, 3rd, 7th, 14th and 30th day it was concluded that :

Solution of sodium hypochloride, solution of penecillin and streptomycin sulphate and Gentamycin sulphate were found to be best.

According to Kirachbain and Hernandez (1963) cellular element of amnion survived even after 45-60 days. Martin (1972) using in vitro technique observed that there was not any specific antibacterial agent was present in amniotic

membrane homogenate. It was proposed that in vivo antibacterial effects seen is due to achievement of biologically closed wound by membrane. Thus allowing the host's own defence mechanism to deal with bacterial population as with other biological dressing. However, the larger size, ready availability and lack of cost make it to be more desirable.

Martin, (1976) observed that the use of amniotic membrane was most rapid way of reducing bacterial level in the operative wounds. In partial thickness wounds, relieve of pain was noted like allograft skin. Membrane adhere better than xenograft and more readily available than allograft. Reduction of bacterial count are equal to allograft and superior to xenograft.

Bose B., (1979) recently reported the amniotic membrane over burn wounds as biological dressing along with previously told benefits : he pointed out that amniotic membrane adhere to remove it even after soaking the area can cause considerable bleeding and pain to the patients. He recommended the use of amniotic membrane especially in developing countries.

NEEM (Botanical Name - AZARDIRACHTA INDICA, Syn - MELIA AZARDIRACHTA, Family - MELIACEAE) :

It is large evaluation tree, present commonly throughout the greater part of India and Burma.

The Bark, leaves and seeds have been used in the Hindu medicine from antiquity and are mentioned in earliest Sanskrit medical writing - Susrita. But we are concerned here with leaves powder of Neem, a better alkalioid -**MARGOSINE** (Cornish, 1856). It also had following constituent, sulphur 0.472% a better yellow substance, resin, glycoside & fatty acid (Roy & Chatterjee, 1921).

The leaves are anti- helminthic (Caius & Mhaskar, 1923), Alexenteric and insecticidal (AYURVEDA) young green leaves are astringent, anti-inflammatory and anti-leprotic in action (YUNANI).

A strongdicotion of the fresh leaves are antiseptic action. Applied to foul & sloughing ulcer and wounds, it retard the sloughing process and prevent the production of Maggots.

Major D.B. Spencer in his "Record of Indian Fevers in 1899" write concerning the therapeutic uses of Neem. All parts of the plant are medicinal

uses especially leaves. A hand full of leaves crushed & flattened will make an excellent particle for boils & sores. Its action is stimulant and antiseptic.

The extract of Neem leaves, Margosine has also antiprozoal as well as antispairochaetal action (Chatterjee & Roy, 1921).

In this way we see that Neem has wide range of effectiveness in burn wound healing as antiseptic, astringent as well as anti-inflammatory.

Henna (Botanical name - *LOWSENIA ENERMIS*. Family. Lathyraceae) is called in Hindi as MEHENDI. It is one of the ancient medicinal plants of India. Every part of plant has own importance in controlling many disease. But we are concerned here with henna leaves powder that has a colouring material called **LAWSONE** (2 -hydroxy nephthoquinene).

The extract of the leaves of Henna showed antibacterial activity against *M. pyogenes*, *veraureus*, strept. Vib. comma & sh. dysenteriae (Bhatnagar et al. 1961 b). Lowsone showed inhibition against *Proteus* species & staph. aureus

(Pandey et al, 1982). Leave extract also showed anti-fungal activity against candida albicans, M. gypseum, T. mentayrophytes, Helminthosperium sp. (Bhatnagar et al, 1961).

U-Stilego tritici, U. hendei (Mishra & Dixit, 1979) Diplodia natolensia (Jain & Pathak, 1970) & antitubercular activity against Mycobacterial strains, M. 607 , M. tuberculosis, 11 37 RV (Bhatnagar et al. 1961b). Lowsone compound was found to inhibit peroxidase activity as well as nitrate reductase activity (Tripathi & Dixit, 1981). The alcoholic extract of henna showed sufficient anti-inflammatory activity and antihyaloronidase activity as cortisone (Singh et al, 1982).

In this way, it is seen that henna powder contains a wide range of effectiveness against Gram +ve, Gram -ve organism as well as some fungi. It's application is painless and easier and chapter as far as our circumstances are concerned.

We use coconut oil as base in application of green leaves powder of Neem & Henna powder that also decreases insensible loss of water from burn area that usually happen in application of other topical agents.

MATERIALS
AND
METHODS

MATERIALS & METHODS

The present study was conducted at M.L.B. Medical College & Hospital, Jhansi during a period of two years i.e. from July 1997 to 1999 to evaluate the use of Neem and Henna paste as effective topical agent and to compare it with application of Henna paste alone, povidone Iodine + Neosporin powder combination and amniotic membrane.

❖ NEEM WITH HENNA PASTE:

Material used was green leaves powder of Neem & Henna powder. Both were easily available. Coconut oil is also easily available in the market. Green leaves powder of Neem with Henna powder was mixed with coconut oil to make apaste like material.

Neem with Henna paste was kept in a large clean bowl & used on burn areas after preparation of burn surface. It was made always a fresh preparation.

❖ ONLY HENNA PASTE:

Henna powder is feely available in market, Henna powder was mixed with coconut oil to make a paste like material.

Henna paste was kept into a large clean bowl & used on burn areas after preparation of burn surfaces. It was made always a fresh preparation.

**POVIDONE-IODINE SOLUTION + NEOSPORIN POWDER
COMBINATON:**

Povidone iodine solution is available in 10% povidone-Iodine form, the container of solution contains 100 ml of 400 ml of PVI taken.

Neosporin powder is available in powder form of 10gm pack, available in material. Thus powder contains following three ingredients.

1. Polymyxin B. Sulphate- each gram of powder contains 500 UBP of Polymyxin B. sulphate.
2. Zinc bacitracin- Each gram of powder contain 400 UBP of Zinc Bacitracin.
3. Neomycin sulphate- Each gram of powder contains 3400 UBP of Neomycin sulphate.

AMNIOTIC MEMBRANE:

Amniotic membrane was collected from the Deptt. of Gynae & obstetrics in case of clear vaginal deliveries & caesarian section.

The placenta with intact membrane was taken directly in a clean tray & was washed throughly in running tap water to remove blood and mucoid materials.

The amniotic membrane was separated from chorion & placenta, gently starting from periphery up to the base of umbical cords. The separated amniotic membrane was prepared in sterile tray containing nermal saline mixed with 40 lacs unit of crystalline penecillin, 80mg of Gentamycin & 100ml of Metronidazol & kept the membrane for at atleast 1 to 2hrs.

The amniotic membrane were preserved in sterile bottle of normal saline is refrigerator at 4°C till the time of application. It can be continuously watched for bad odour & change in colour from white to yellow or brown.

SELECTION OF CASES :

All the cases with superficial & deep burn up to 50% of surface who came to emergency ward of hospital within one week, were included in their study irrespective of their age, sex, socioeconomic status, contamination of wound & mode of injury.

METHOD OF STUDY

The selected cases were subjected to detailed history and physical examination which were recorded on following lines :

1. History :

- Introduction, name, age, sex, occupation, rural/urban, address, date of admission, date of discharge and time of healing.
- Recording the burn accident, date and time of burn, (duration of burn, place, nature of work at the time of accident, cause of burn and treatment given prior to admission (if any)).
- Symptoms.

2. Physical Examination :

- General Examination : The cases were examined for general condition, pulse, blood pressure, temperature, respiration and hydration.
- Local examination :

A. Percentage of Burn : It was calculated by Wallace Rule on Nine in the adult and "Lund and Bowder chart" in children.

B. Depth of Burn : Superficial/ deep.

Estimation of Depth of Burn :

The hypodermic needle was used to treat the pain sensation. The area with increased sensibility was considered to the superficial or partial thickness burn. The area with marked reduced or absent pain sensitivity was considered to be deep or full thickness burn. This was also confirmed by pulling out a hair from surface. On the 3rd degree deep burn, hair pulls out easily and painlessly. The later test is of value in borderline cases of second degree form. In addition help of the following criteria was also sought.

CLASSIFICATION OF BURN WOUNDS ON THE BASIS OF DEPTH

Depth	Appearance of Burn Area	Pain sensation
1 st degree	Erythematous	Painful and hyperaesthetic
2 nd degree - A	Blister with reddened base	Painful and hyperaesthetic
B	Blister with blanched base	Painful and hyperaesthetic (or) anaesthetic at place
3 rd degree	Leathery pole or pearly white or charred death.	

The 1st and 2nd - A were graded as superficial and 2nd B and 3rd degree were considered as deep burn.

C. Contamination of Wound :

- Apparently clean : No contamination of foreign body, clean intact, blisters.
- Mild contamination : Slight contamination, ruptured blisters, open wounds.
- Gross contamination : Heavy contamination with dirty cloths, foreign body, dust, soakage and pus.

D. Area involved :

Diagrammatic representation in anterior, posterior and lateral views (shown in the attached performa).

E. Appearance of raw area :

Resuscitation and general treatment :
Resuscitation was done according to need and general treatment started on conventional lines (intra-venous fluids, blood, plasma, analgesics, antibiotics, antitetanus serum, tetvac injection etc.).

Investigations:

Blood-Complete Haemogram

Serum electrolytes

Urine-Complete gross and microscopic examination

LOCAL MANAGEMENT OF WOUNDS :

Preparation of burn surface ;

A swab from burn surface was taken for culture and sensitivity test. Patients were given necessary sensation. A gently but through

debridement of wound was done by removing necrosed skin and blisters. The area was given tested for degree of burn. Then the wound was cleaned with 0.05% savlon solution, twice followed by sterile normal saline thoroughly. The spirit was applied over adjacent skin around the margin of wound area. Now the wound was dressed locally according to the proposed group.

On the basis of local treatment of wound, patients were divided into :

Group A - Where the Neem & Henna paste was applied, topically.

Group B - Where the henna-paste was applied, topically.

Group C - Where the povidone - Iodine solution + Neosporin powder combination was applied.

Group D - Where the amniotic membrane was applied.

Application of Neem with Henna paste :

Fresh leaves of Neem with Henna paste was applied over burn area in the form 2-3 layers after preparation of burnt wounds as described above. One after another three layers of Neem & Henna paste were applied to form a crust of

paste over burn wound. Each such application was repeated every day in a similar manner described above.

Application of Povidone-Iodine lotion + Neosporin powder combination:

Neosporin powder was sprinkled over burn area till a uniform coating was made. After that povidone-Iodone lotion was applied so that thick yellow crust were formed.

Application of Amniotic Membrane:

Fresh or preserved amniotic membrane was taken out from the bottle with the help of forceps. The membrane with bad odour and colour changes was discarded. It was stretched up and then applied over burn area about one inch beyond the margins. The temperature of the membrane and wound was not considered. The air bubbles between membrane and wound were removed. The patients were instructed not to move the part until the membrane became adhered and relatively dry. It was left as such without any dressing except in children and uncooperative patients where the dressing was applied to retain the membrane.

ASSESSMENT OF RESULTS:

The assessment of the results was done by interview with patients, examination, visits and investigations.

Interview:

The patients were asked about:-

- 1.) Pain and discomfort (mild, moderate and severe)
- 2.) Fever.
- 3.) Any evidence of allergy as itching, rashes, nausea and vomiting.

Physical Examination:

General examination:- General condition, hydration, pulse, B.P. and signs of toxemia.

Local examination:

Observation for the following was done.

- 1.) Presence of discharge and/or soakage.
- 2.) Appearance of burn area covered by neem with Henna paste, henna paste alone, PVP + Neosporin & amniotic membrane, respectively.
- 3.) Collection of pus under dressing, if the pus was located, it was cleaned and thoroughly washed. Fresh application was

done. A pus swab was taken for culture sensitivity and quantitative and qualitative bacteriological test.

4.) Epithelisation of wound.

5.) Total duration of healing.

INVESTIGATION:

Routine: HB, PVC, TLC, DLC.

Urine-Routine and Microscopic.

Serum electrolytes.

Blood sugar. Blood urea and serum creatinine.

Quantitative and qualitative bacteriological test:

Swab surface culture.

TREATMENT:

1. I/V fluids.

2. Blood.

3. Sedatives.

4. Analgesics.

4. System antibiotics.

CARE:

Care was taken to keep the variable comparable in all four groups especially percentage of burn depth, systemic treatment and other variable as far as possible.

PROFORMA

A. Introduction

Name of patient	Date and time of admission
Age and sex	Date of discharge
Occupation	Total time of healing
Rural/Urban	Group of local management
Address	Interval of amniotic membrane Between preparation and application

B. Clinical history

- 1.) Date and time of burn
(Duration of burn).
- 2.) Place of accident and nature of work
during accident.
- 3.) Cause of burn.
- 4.) Prior treatment (if any).
- 5.) Symptoms.

C. Physical examination:

General Examination

General condition

Blood pressure

D. progress Report:

1. Intermediate effects of dressing.
2. Soakage and/or pus discharge.
3. Change in amniotic membrane.
4. Appearance of healed wound.
5. Result: Cured/Required skin grafting/Rejection
/Contracture or thick scar/expired.

e. Investigations :

Blood	:	TLC
		DLC
		Hb%
		Sugar
		Creatinine
		Urea

Urine : Sugar
Albumin
M/E

Culture and sensitivity report

- 1.
- 2.
- 3.

F: Photographs of the patients.

G: Treatment.

Type	Duration
1. Analgesic	
2. Sedatives	
3. System Antibiotics	
4. Intravenous fluids	
5. Anti-allergic drugs	
6. Additional drugs like Ranitidine etc.	

Pulse

Hydration

Local Examination

Percentage of burn

Contamination of wound

Appearance of raw area

Area involved (Diagrammatic)

Anterior View

Posterior View

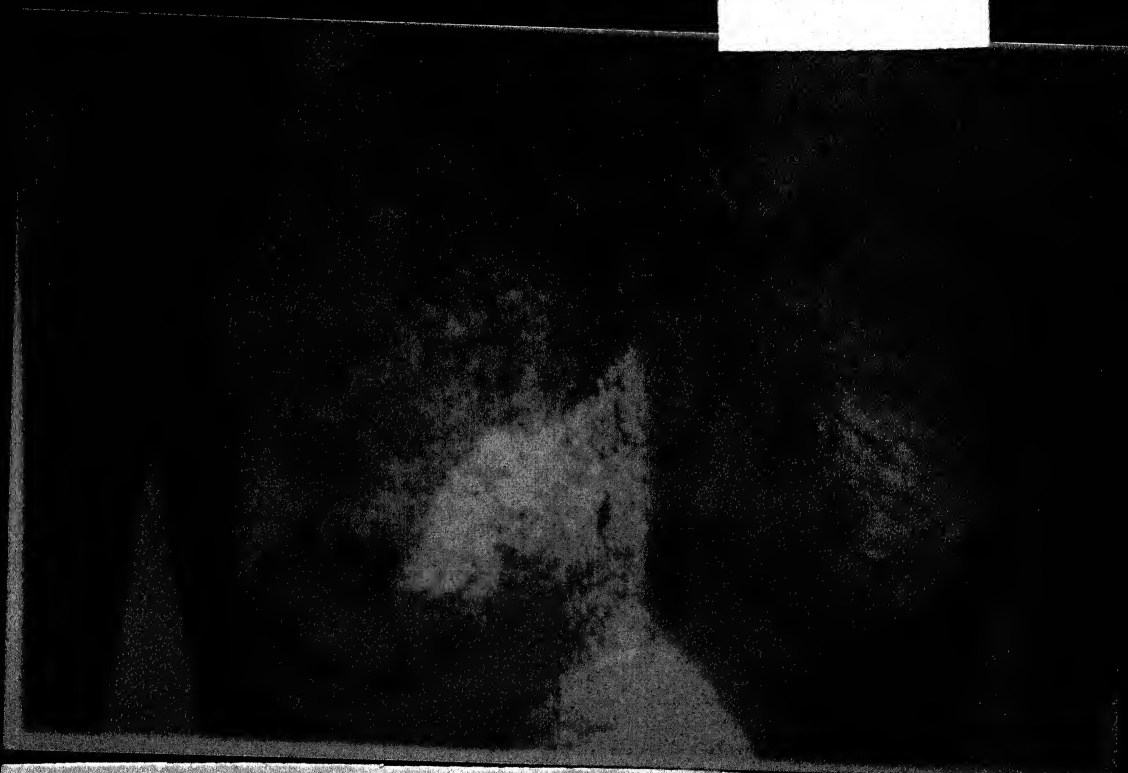
Lateral View

Photograph -1
40% Burn wound surface showing healing on 20th
day which dried up amniotic membrane on arm.
With equal effect of both applications.



Photograph -2

Wound surface area on 25th day. In
neck red granulation due to deep burn.





Photograph -3-A

Showing superficial burn surface healing on 20th day.



Photograph -3-B

Same case wound surface area on 30th day.

Photograph -4

Showing healing and epihtelization on the 28th day.


Photograph -5-A

Showing a case treated by local application of
Henna & Neem on 20th day.

Photograph - 5-B
Same case on 30th day.


Same case

Photograph -6
Showing complete healing on 14th day.



Photograph - 7

Wound surface showing healing on 21st day.



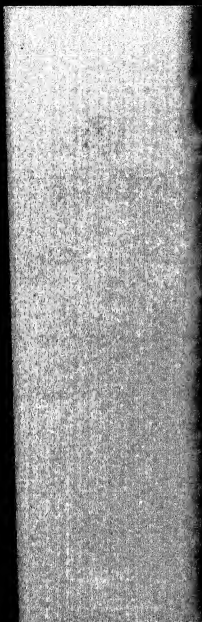
Photograph - 8

Showing healing on 20th day.



Photograph - 9

Wound surface showing healing which tanning
effect of henna.



Photograph - 10

Healing on 14th day which tanning effect of henna.



Photograph -11

Case treated by local application of henna
on superficial burn.



Photograph - 12 (a)

Comparison study of local Henna which Neem
as right side of chest and amniotic
membrane on left side.



Photograph - 12 (b)

Same case shows a comparison
healing on 10th day. Amniotic
membrane with eschar still
can be seen on left side.



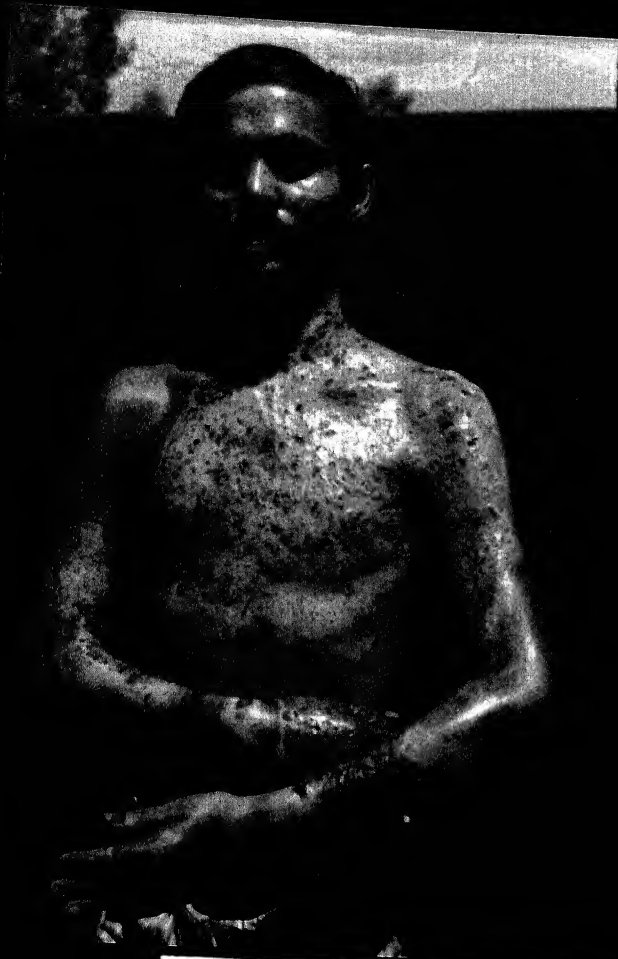
Photograph -12 (c)

Same case showing comparison in healing on 10th day with a closer view.



Photograph -12 (d)

Same case showing comparison in healing on 15th day showing equal healing on both side.



Photograph -12 (e)

Same case showing comparison in healing on 15th day. Deep burn on dorsum of right hand.



Photograph -12 (f)

Same case showing comparison in healing on 20th day. More healing on right (Henna with Neem) .

Photograph -12 (g)

Same case showing comparison in healing on 20th day. A closer view shows more healing on Henna with Neem side.

Photograph -12 (h)

30

Photograph -12 (h)

Same case showing comparison in healing on 30th day. A closer view shows completed healing on right (Henna with Neem side). Amniotic membrane side (left is still granulating).

OBSERVATIONS

OBSERVATION

In surgery department of M.L.B. Medical College & hospital, Jhansi. In a span of two years from Dec. 1997 to Dec.1999. 82 burn patients were selected from both sexes & age group ranging from 1 to 50 years & body surface area of less than 50%. In this present study. More than 50% burn surface were excluded from the study because of high mortality.

Table 1. : Showing sex incidence in burn cases :

Sex	Number of Cases	Percentage
Male	30	36.58
Female	52	63.41
Total	82	100

Table 1. Shows that out of total 82 cases studied there were 30 (36.58%)

males & 52 (63.41%) female with M:F ratio of 1 : 1.73 approx.

Table 2. : Showing mode of burn :

Mode of Burn	Number of cases	Percentage
Thermal Burn	73	89.02
Electrical Burn	8	9.75
Chemical Burn	1	1.13
Total	82	100

It is clear from table 2. That most of the patients had thermal burn and rest 8 (9.75%) had electrical burn. One patient had chemical burn injury.

Mostly farmers were affected by open wire for electricity provided for pumping water for irrigation.

Table 3. : Age & Sex incidence

Age	Male	Female	Total
0-10	5	7	12
11-20	5	5	10
21-30	10	25	35
31-40	8	12	20
41-50	2	3	5
>50	-	-	-
Total	30	52	82

Table 3. Depict that maximum 35 cases of both sexes were from age group 21-30 years & only 12 cases from less than 10 years. Total of 5 cases were affected in age group 41-50. So we can say that persons in their active years of life are much prone to sustain injury as compared to extremes of life.

Table 4. : Distribution according to location of burn accident & sex

Location of burn accident	Male		Female		Total	
	Number	%	Number	%	Number	%
Indoor	7	23.33	47	90.38	54	65.85
Outdoor	23	76.66	5	9.61	28	34.14
Total	30	100	52	100	82	100

Table 4. Shows that most of burn injury occurred in indoor location as a whole 65.85% (54/82) among female (90.38%) cases sustained burn injury at home 23.33 male cases sustained burn injury at home.

Table 5. : Distribution of cases according rural & urban incidence in burn injured.

Area	Number of cases	Percentage
Rural	65	79.26
Urban	17	20.73

Table 5. Shows that incidence of burn injury was approximately four time more in rural (79.26%) population as compared to urban (20.73%) population.

Table 6. : Distribution of cases according to duration from injury to admission to hospital:

Duration (Days)	Number of Cases	Percentage
0-1	50	60.97
1-2	14	17.07
2-5	10	12.19
5-7	6	7.31
>7	2	2.43

It is clear from table 6 that out of 82 cases 50 patients (60.97%) reached to hospital with in 24 hours of burn accident and only 2 cases (2.43%) reached the hospital after 7 days of accident.

Table 7. : Grade of contamination of wound at the time of admission :

Grade	Number of Cases	Percentage
Apparently clean	56	68.29
Mild	21	25.60
Grossly	5	6.09
Total	82	100

Table 7. : Shows that out of 82 cases 56 (68.29%) were apparently clean & 21 cases were mildly

contaminated & remaining 5 (6.09%) cases were grossly contaminated at time of admission.

Table 8. : Distribution of cases according to local management of wounds.

Group	Number of Cases	Percentage
Neem+Heena (A)	29	35.36
Heena Paste (B)	22	26.82
PVP+Neosporin(c)	15	18.29
Amniotic Membrane(D)	16	19.51

All 82 cases were divided into four groups according to topical management of were wounds.

Table 9. : Depth of Burn:

Depth of burn	Group (A)	Group (B)	Group (C)	Group (D)	Total
Superficial	24	19	10	16	69
Deep	5	3	5	0	13
Total	29	22	15	16	82

In group A. 24 cases belonged to superficial burn & 9 cases to deep burn.

In Group B. 19 cases belonged to superficial burn & rest 3 cases to deep burn. In group C. 10 were from superficial & rest 5 from deep burn. In group D. All 16

patients were belonged to superficial burn, we included 69 cases of superficial burn & 13 cases of deep burn.

Table 10. : Showing percentage of body area surfaced involved are treated by four different local managements :

Percentage Burn Area	Heena+Neem (A)		Heena only (B)		PVP + Neosporin (C)		Amniotic Membrane (D)	
	No.	%	No.	%	No.	%	No.	%
0-10	3	10.34	2	9.09	3	20	1	60.25
11-20	5	17.24	5	22.72	3	20	10	62.50
21-30	5	17.24	5	22.72	3	20	4	25
31-40	10	34.48	4	18.18	3	20	0	0
41-50	6	20.68	6	27.27	3	20	1	6.25
Total	29	100	22	100	15	100	16	100

Out of 82, 9 cases from less than 10% body surface area & 33 cases from 31 - 50% body surface areas.

Table 11. : Immediate effects of type of dressing applied over wounds.

Type of dressing In group	Total Wound surface	Pain & discomfort				Allergic, Symptoms			
		Relieved		Retained		Rigor	Rashes	Vomit ing	Giddi ness
		No.	%	No.	%				
Neem + Henna (A)	29	28	96.55	1	3.44	Nil	Nil	Nil	Nil
Henna Paste alone (B)	22	21	95.48	1	4.54	Nil	Nil	Nil	Nil
PVP + Neosporin (C)	15	13	86.66	2	13.33	Nil	Nil	Nil	Nil
Amniotic Membrane (D)	16	15	93.75	1	6.25	Nil	Nil	Nil	Nil

After application Neem with Henna paste in burn wound pain & discomfort relived in 28 (96.55%) patients with in ½ hours. And but persisted in 1 case & got relived in 24 hours.

In Group B pain & discomfort relived in 21 cases (95.45%). In Group C pain & discomfort were relived in 13 patients (86.66%) & Group D pain & discomfort completely disappeared in 15 patients (93.75%). No allergic reaction was seen in any group.

Table 12. : Soakage and Pus formations :

Type of Dressing In group	Total wound surface	Soakage		Pus formation	
		No.	%	No.	%
A	29	14	48.27	8	27.58
B	22	11	50	7	31.81
C	15	7	46.68	5	33.33
D	16	5	31.25	4	25

Table 12. Depict that out of 29 wound surface of Group A. 14 (48.27%) wound had soakage & 8 had pus formation seen clinically.

In Group B. out of 22, 11 (50%) had soakage & 7 had pus formation .

In Group C 46.66% had soakage and 33.33 had pus formation.
In Group D out of 16 cases 5 (31.25%) had soakage & 4 (25% had pus formation.

Table 13. : Surface culture report after treatment.

Organism	Group A days		Group B days		Group C days		Group D days	
	10 th	20 th	10 th	20 th	10 th	20 th	10 th	20 th
Staphylococcus	3	1	3	2	2	1	2	1
E .coil	2	3	1	2	1	2	0	1
Proteus	2	2	1	1	1	1	1	1
Pseudomonas	1	2	1	2	1	1	1	1
Klebsaella	0	0	1	0	0	0	0	0

From all the patients surface culture was taken for quantitative analysis on 10th days and 20th days & also at the time of admission.

The most commonly involved organism were staphylococcus, E.coli. Proteus and pseudomonas.

Table 14. : Showing rate of Healing.

Total time of healing (Days)	Group A					Group B					Group C					Group D				
%	0-10	11-20	21-30	31-40	41-50	0-10	11-20	21-30	31-40	41-50	0-10	11-20	21-30	31-40	41-50	0-10	11-20	21-30	31-40	41-50
7-14 days	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14-21 days	1	2	2	3	-	1	2	1	1	1	1	-	-	-	-	-	3	2	-	-
21-28 days	1	2	2	4	2	-	3	3	2	2	2	2	1	1	-	1	5	2	-	1
28-35 days	1	1	1	2	3	-	-	1	1	2	-	1	2	2	2	-	2	-	-	-
> 35 days	-	-	-	1	1	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-
Total	3	5	5	10	6	1	5	5	4	6	3	3	3	3	3	1	10	4	0	1

In Group A where application of Neem with Henna paste was done topically.

Most of the wounds healed around 28 ± 7 days.

Table 15: Showing total healed cases in a specific time.

Total time of Healing(days)	Group(A) Henna with Neem	Group(B) Henna	Group(C) Betadine with Neosporin	Group(D) Amniotic Membrane
14-21	8 *	6	1	5
21-28	11	10	6	8
28-35	8	5	7	2
>35	2	1	1	0
Total	29	22	15	16

- 8 patients treated with Henna and Neem healed in 14 to 21 days.

Table 16: Showing percentage of patients healed in a specific period

Total time of Healing(days)	Group(A) Henna with Neem	Group(B) Henna	Group(C) Betadine with Neosporin	Group(D) Amniotic Membrane
14-21	27.58	27.27	6.66	31.25
21-28	37.93	45.45	40	50
28-35	27.58	22.72	46.66	12.50
>35	6.89	4.54	6.66	0

Up to 28th day total healed cases

Group A-65.51

Group B-72.52

Group C-46.66

Group D-81.25

DISCUSSION

DISCUSSION

Burns are notorious in the sense that they break the continuity of skin & produce raw area, which is prone for invasion by micro-organism. Water retention ability of skin depends on its effective water pressure & diffusion barrier offered by Keratin layers and lipid contents in the stratum corneum. Thus lipid is thermolabile, when this barrier is removed after burn injuries, the effective vapour pressure gradient is increased by 15-20 times. This results into a large amount of evaporative water loss amounting to an increase to 3-10 times of normal rate insensible water loss (40 ml/hour). The amount and duration to which the loss persists depends on the depth & percentage of burn.

Therefore the main aim in the treatment of burn is to re-establish the continuity of skin. In superficial burn healing may occur spontaneously but the damage of conversion of superficial to deep burn by infection & desiccation and loss of body constituent remains a major problem and therefore coverage of raw surface areas becomes necessary.

Autogenous skin grafting is the most accepted procedure for management of raw areas. But it can not be used in all the cases due to following limitations.

Non availability of large amount of donor area.

Patients may be unfit for surgery due to shock & other reason.

Patients and his relatives may not co-operate due to religious, sentimental or ethical grounds.

There are various dressing material either biological or synthetic or antiseptic cream used to cover the burn wound.

The present work is a study of effect of fresh leave powder of Neem with Henna paste application on burn patients of 50% or less than 50% irrespective of sex, age, socio-economic status, inhabitancy, mode, cause & contamination. All depths of burns

Were included. Effect of Henna paste alone, effects of PVP + Neosporin powder and effect of amniotic membrane and assessment of their

efficacy & results and comparison of result with results Neem with Henna paste application topically.

1. It was observed that female were more suffered than males in ratio of 1:1.73% approx. in age group of 11-40 years.
2. In our country, females are maximally indulged in house hold works & more liable to burn injury by fire appliances. According to place of injury, females were more liable to have burn injury in indoor.
3. Table three demonstrates that the burns suffered maximum were during the active life of the victim. Incidence in females were mostly indoor, either while cooking or probable dowry death. On the other hand male suffered the injury while working out door usually in the hotels and restaurants (scalding) or while irrigating the fields (electrocution).
4. Most common cause of burn injury were thermal burn by fire .In this study it was found that (89.02%) cases had sustained burn injury by fire, 9.75% had by electric burn and 1.13% by chemical burn.

5. In this study, it was significant to note of the cases 50 out of 82 reached to hospital within 24 hours, 8 cases reached after 5 to 7 days irrespective of distance, social stigma & percentage of burn.

6. In the present study it has been noted that pain & discomfort disappeared in 28 out of 29 (96.55%) in group A. It has already been told that Henna has a soothing effect. Pain and discomfort disappeared within half an hour. In Henna paste alone pain & discomfort disappeared in 95.45% cases & in PVP + Neosporin combination it was 86.66%.

In amniotic membrane group (D) pain & discomfort disappeared in 15 out of 16 cases (93.75%). It was due to coverage of exposed free nerve ending by the membrane.

7. In Group A, soakage was found in 14 cases out of 29 cases which gradually disappeared in average duration of 7 to 14 & 8 cases out of 29 cases developed pus formation.

Group B cases had 50% (11/22) soakage & 31.81% (7/22) pus formation.

In PVP + Neosporin combination. Out of 15 cases 7 had soakage & 5 had pus formation which was subescharal.

In amniotic membrane covered wound, soakage was found in 31.25% cases & 25% cases had pus formation. These cases were deep burn wound.

In comparison study we found amniotic membrane dressed wound had least soakage & pus formation. Neem with Henna paste & Henna paste alone wounds had almost similar effects.

In the present study 82 cases were studied after application of four different topical agents. Neem with Henna paste applied in 29 patients (Group A), Henna paste alone applied in 22 patients (Group B), PVP + Neosporin powder was applied in 15 patients (Group C) & amniotic membrane was applied on 16 patients.

8. Neem with Henna paste has mild to moderate antibacterial activity & also antifungal activity. Coconut oil used as based was used to check undue

evaporation of water from raw area. Henna also gives tanning effect (Chatterjee & Roy. 1921, Pandey et al. 1982).

PVP + Neosporin powder combination forms an almost complete barrier against microbials. Neosporin powder contains polymyxin neomycin & bacitracin. The Polymyxin can protect burn wound against colonisation by *Pseudomonas* but not against *staphylococcus aureus*, and hemolytic streptococci.

Povidone - Iodine on the other hand has antibacterial, antifungal, sporocidal & virucidal properties.

The Tanning effect of PVP has an added advantage on dead layers of skin creating a demarcation between viable and nonviable areas.

Amniotic membrane is the inner one of the two foetal membrane. It is thin transparent, elastic & strong, which can cover a wide surface area.

Pigeon (1960) described amniotic membrane like an extension of body skin. Once therefore a good substitute for autograft skin in superficial burn.

9. On qualitative analysis in surface culture report it was found that all groups had almost similar result with minimum pus in group D. It is documented that most common organism in early burn wound are staphylococcus aureus & streptococcus pyogenes & in late burn wound are pseudomonas & E-coli. These micro-organism infected the burn wounds are from hospital environment i.e. nosocomial infections.

10. In the present study, it was found that in Neem with Henna paste application group & Henna paste alone application group, No allergic reaction, no rejection, no skin grafting required except in two deep burn cases of 40 -50% body surface area although 1 patient had developed contracture formation due to lack of physiotherapy advised to patients.

In PVP + Neosporin group no allergic reaction, no rejection but 2 contracture & 2 cases of deep burn required skin grafting.

In amniotic membrane application 1 cases of rejection found.

11. As far as healing time is concerned it was 28 ± 7 in most of cases in Neem with Henna paste group. Healing time was around 28 - 35 days in rest all groups.

In group A, out of 29 cases, 8 wounds healed within 21 days, 11 wounds within 28 days & rest within 28 to 35 days.

12. Regarding hospital stay, it was average of 21 ± 7 days in Neem with Henna paste & Henna paste alone groups. Which was comparable to PVP + Neosporin and amniotic membrane group.

13. Table 15 & table 16 shows that 65.51% cases in group A healed within 28 days which was lower than group B proving Neem does not increases efficacy with Henna. Betadine and Neosporin group showed 46.6% healing in 28 days much lower than group A, of course amniotic membrane was most superior showing 81.25% healing.

Over all this study showed hospital stay is little more in Neem with Henna paste & Henna paste alone group as compared to amniotic group.

The major advantage of Neem with Henna paste group over amniotic membrane is that it is very much

effective also in deep burn & neglected burns where amniotic membrane usually failed or required reapplication & little cheaper & easily availability because of its use as Indian remedies.

Neem with Henna paste & Henna paste alone have also advantage over PVP + Neosporin powder group as it is cheaper in cost & easy to application & removal.

CONCLUSION

CONCLUSION

The comparative effective of Neem with Henna paste, Henna paste alone. PVP + neosporin powder combination & amniotic membrane application were studied & compared in 82 cases of varying degree of burn less than 50% body surface area. At the same time, superiority of either of them was accessed.

This study was conducted in the patients of superficial to deep burn, less than 50% body surface area involvement, who came to M.L.B. Medical College Hospital with one week of burn injury.

The conclusions drawn from the present study are as follows: -

- ◆ Females are more sufferer in the age group of 11-40 years of age.
- ◆ Most of the burn injuries took place in indoor activities for females and in outdoor activities for males.
- ◆ Maximum burn injuries occurred in rural area.
- ◆ Most of the burn injuries are due to flame burn.

- ◆ Patients with major burn reach directly to Medical College Hospital, much earlier than those with minor burns.
- ◆ No allergic reactions in all four types of dressing.
- ◆ One to two burn contractures developed in each group due to lack of physiotherapy.
- ◆ All four dressing materials are easier to application & removal & have easy availability irrespective of cost.

On comparing the effects of all four dressing to assess the superiority of either of them, following conclusions were also drawn.

1. There was no need for preservation of Neem with Henna paste & Henna paste alone. It is made fresh always & does not require sterilisation while the amniotic membranes required skill work because of its collection, separation, preservation & application.
2. Pain & discomfort relieved in Neem with Henna paste, Henna paste alone and PVP + Neosporin powder after some time i.e. 30 minutes while in amniotic membrane group relieved immediately after application due to wound coverage.

3. The healing is little bit faster in amniotic membrane because of less incidence of infection & presence of lysozyme, immunoglobulins & other chemical mediators.

Although amniotic membrane application have better results in fresh cases of superficial burn in comparison to rest of the groups. But Neem with Henna & Henna paste alone groups have almost similar results overall.

4. Regarding hospital stay, amniotic membrane group have little shorter than rest of the groups i.e. 28 + 7 days irrespective of %age of burn.

In our country where majority lives in the area of poverty, Neem with Henna application deserves to be an effective and good alternative to best topical agents for burn patients available today.

BIBLIOGRAPHY

BIBLIOGRAPHY

- 1) Artz. C.P. History of burns, In c.p. Artz J.A. Moncreif, B.A. Pruitt (eds). Burn: A team approach Philadelphia W.B. Saunders co. 1979 p3 -16.
- 2) Artz C.P. Historical aspects of burn management, Surg, Clin. North Am 50 (6) 1193, 1970.
- 3) Bhishagratha K.K.H. An English translation of the Susruta samhita based on original Sanskrit Series office 1963 p 91-97.
- 4) Blocker T.G. History of the treatment of burns. In J.B. Lynch, S.R Lewis (eds) Symposium on the treatment of Burns volv St. Louis C.V. Mosby Co. 1973 pl.
- 5) Cockshott W.P. The history of the treatment of burns Surg. Gynae, Obstet 102.116,1956.
- 6) Haynes B.W. The history of burn care. In J.P. Boswick (ed.), The Art and Science of burn care Maryland : Aspen Publishers Inc. 1987 p 3-9.

- 7) Moncrief J. The development of topical therapy J. Trauma 11.906, 1971.
- 8) Pinnegar M.D. Pinnegar F.C. History of burn care Burn 12 (7). 508, 1986.
- 9) Shedd. D.P. Historical Landmarks in the treatment of burn surgery 13. 1024, 1958.
- 10) Fox, C.L. Jr. : Silver Sulphadizine for control of burn wound infection. International surgery vol. 60 No. 5, 1975.
- 11) Bhatnagar, S.S. Snatapau, II., Desa, J.D.H., Marior, A.C., Gladiallp, N.C. Soloman, M.J. Yellore, S. and Rao, T.N.S. (1961 b) : Biological activity of Indian medicinal plants Part -I antibacterial, anti-tubercular and anti-fungal action. Indian J. Med. Res., 49 :799.
- 12) Charya, M.A.S., Ready, S.M. Kumar, B.P. and Reddy, G.R. (1979) : Laboratory evolution of some medicinal plants extract against two pathogenic fungi, New Bot, 64 : 171.
- 13) Dixit, S.N. Srivastava, H.S. and Tripathi, R.D. (1978) : Lowsone antifungal antibiotic from

leaves of lowsonia thermis and some aspects of its mode of action. Indian Phytopathol., 31 : 131.

14) Kirtikar & Basu : Indian Medicinal Plant. Vol. I.

15) Chopra, Handa & Kapur : Indegenous drugs of India, IInd edition, 1982. Academic Publishers, P. 359.

16) Watson, Chatterjee & Mukharjee : Jour. Soc. Chem. India, 1923.

17) Sen & Banerjee : Journ. India Chem. Soc., 1931.

18) Jain J.P. & Pathak, V.N. (1970) : Anti-inflammatory and antilyaloconidase activity of leaf extracts of certain plants. Labdev J. Sci. Technol. 83 :58.

19) Gupta S. & Gupta S.S. (1978) : Anti-inflammatory and antilyaloconidase activity of Lowsonia thermis. Prof. Decermial Conf. Indian Pharmacol. Soc., Calcutta. Dec. 29-31, 1977. Indian J. Pharmacol., 10 : 90.

- 20) Misra, R. and Kapoor, L.D. (1971) :
Pharmacological study of Mehndi. J. res. Indian
med., 6 (3) : 252.
- 21) Mishra, E.S. and Dixit, S.N. (1978) : anti-
fungal activity of leaf extracts of some higher
plants. Acta Bot. India, 7 : 147.
- 22) Verma M.R. and Rai, J. 1968 :
Spectrophotometric and chromatographic studies of
henna leaf and powder extracts. I.S.I. Bull., 20
: 495.
- 23) Mc. Mans, W.F., Goodwin. T.W. J.R., Maison,
A.D. J.R. et al. Burn wound infection. J. trauma,
1981. 753 -756.
- 24) Artz. C.P. Mancrief, J.A., Pruntt. B.A. (Eds.)
: Burn a team approach Pholadelphia., W.B.
Saunders Co., 1976.
- 25) Mroyer, Brentano & Graves., D.L. et al.
Treatment of large human burn with 0.5% Ag. Sol.,
Surgery, 90, 812, 1965.

- 26) Munster, A.M. Helvig, E. Rowland, S. : Cerium Nitrate silver sulphadiazine cream in treatment of burns - A prospective evaluation Surgery, 88, 658, 1980.
- 27) Paterson. M.D. ; Topical anti-microbial in J.A. Coswick (Ed.) the Art and Science of burn case. An Aspen publication, 1987, p. 181.
- 28) Pietset, J., Meakin, J.L. : Complications of Povidone Iodine absorption in topically treated burn patients, Lancet, 1 : 280, 1976.
- 29) Gullermo, colocho et al : Human amniotic membrane as a physiologic normal Dressing. Arch surg. 109 :370, 1974.
- 30) Hoyes, A.D. : Fine structure of human amniotic epithelium in early preg mony Br. J. obst. Agh 74 : 949, 1968.
- 31) Martin, C., Robson et al. : Amniotic membrane as a temporary normal dressing. Surg. Gyh. Obst. 136 : 904, 1973.

- 32) Mono Crief, J.A. : Topical antibacterial therapy of Burn wounds clinical Plastic Surgery 1: 563-76, 1974.
- 33) Bopat, c.v. et al. : Preliminary Report on acceleration of wound healing by amnion graft India. J. mED Res 62 (9) : 1342-6, Sept., 1974.
- 34) Bose, B : Burn wound Dressing with human amniotic membrane Ann. R. Coll. Surg Engl. 61 (6) : 444-7, 1979.
- 35) Bromberg. B.E., Song I.C., and mogn, M.P. The use of pig skin as a temporary biological dressing. Plast, Recons. Surg., 36: 80, 1965.
- 36) Burger, K. : Experimental and clinical studies on transplantation of fetal membranes on. Hetil, 82 :800, 1938.
- 37) Copeland, W.P. : The treatment of Burns med Recurrence. 31 : 518. 1887.
- 38) Dino, B.R. Enfemio, G.K., and Devilla, M.S. : Human amnion : The establishment of an amnion bank and its practival applications in surgery. Phil. Med. Assoc. 42; 357, 1966.

- 39) Douglas, B : Homografts of fetal membranes as a covering for large wound especially treatment for burns : An experimental and clinical study. J. Tenn. Med, Assoc. 45 :230-5, 1952.
- 40) Fox, C.L., Jr. Rappole, B.W., Stannford W.T. : Control of Pseudomonas infection by silver sulphadiazine surg. Kynae. Obst. 128 : 1021, 1969.